

Optimization of TIG Welding Process Parameters for X70-304L Dissimilar Joint Using Taguchi Method

Mohamed Farid Benlamnour, Mohamed HADJI, Riad BADJI, Nabil Bensaid, Tahar Saadi, Yazid Laib dit Laksir, Sabah Senouci

Abstract: The optimization of mechanical properties of the welded joints requires a statistical approach such as Taguchi experimental designs associated with experimental techniques and laboratory characterizations. The aim of this work is to propose a method of optimization of the mechanical performances of a TIG dissimilar welding of two grades of steels: a high strength low alloy steel X70 and an austenitic stainless steel 304L. The experimental designs were chosen according to the Taguchi method L9. The metallurgical characterization includes optical microscopy, SEM microscopy, EDX analyses and mechanical tests to establish a relationship between welding parameters, microstructures and mechanical behavior in different dissimilar weld regions. The results showed that the hardness is more strongly related to microstructural evolution than tensile strength of dissimilar joint. It was found that gas flow is the main significant TIG welding parameter affecting dissimilar weld characteristics.

Keywords : hardness, tensile test, ANOVA, Dissimilar welds, Taguchi method